

# Outdoor Asthma Triggers:

## Montana Asthma Advisory Group

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# *May is* **Asthma Awareness Month**

**May is Asthma  
Awareness Month**



Clear the air!  
Wear Grey  
in support of  
World Asthma Day  
May 7th 2013

[www.breathenh.org](http://www.breathenh.org)

# Asthma Triggers: Outdoors

## Allergic

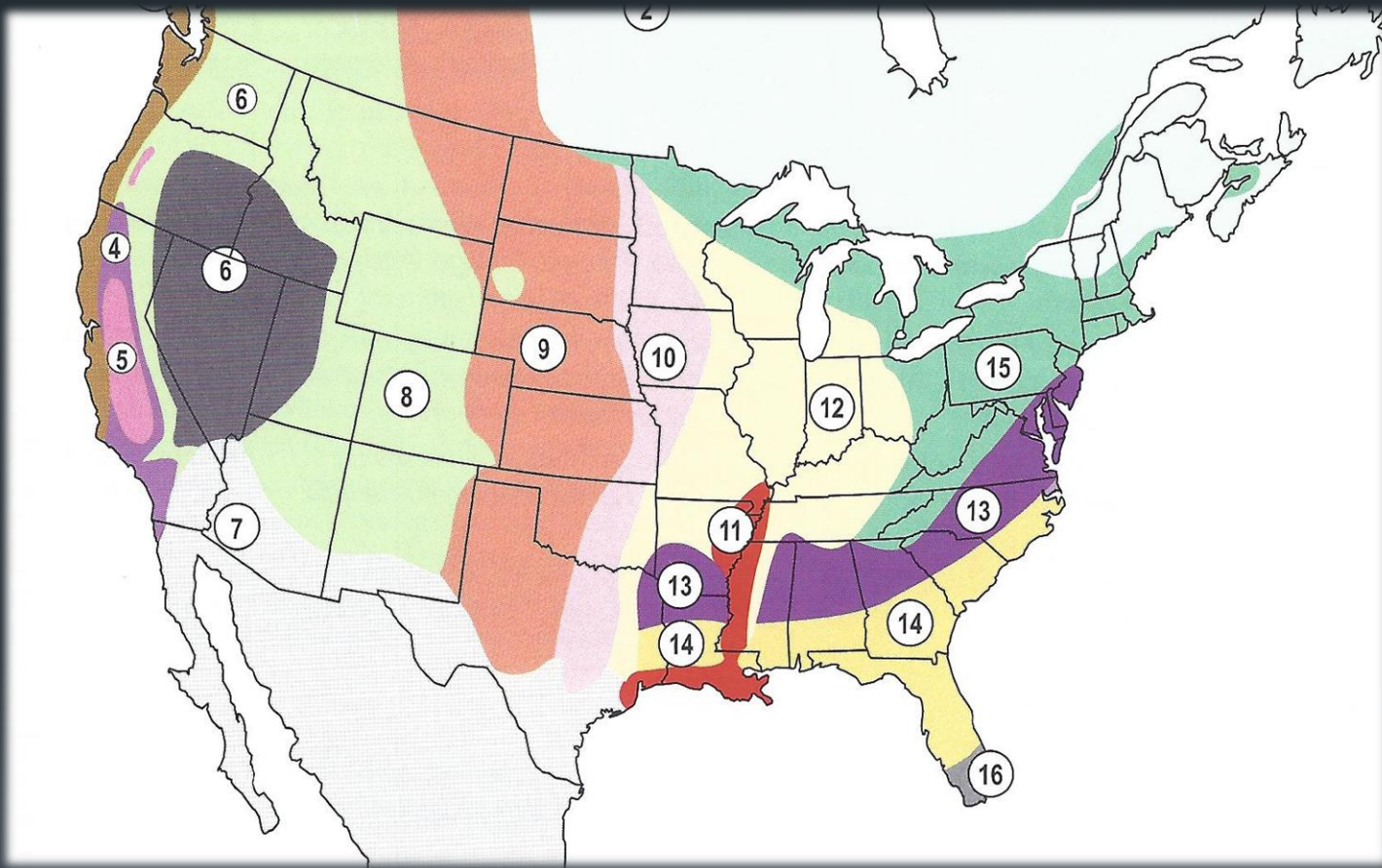
- Seasonal
- Intermittent



## Non-Allergic

- Smoke
  - Wild fires
  - Prescribed burning
  - Wood stoves
- Other air pollution
  - Industrial
  - Motor vehicles

# Floristic Zone: Pollens



8. Western Region: Cordillera (chain of mountain ranges)

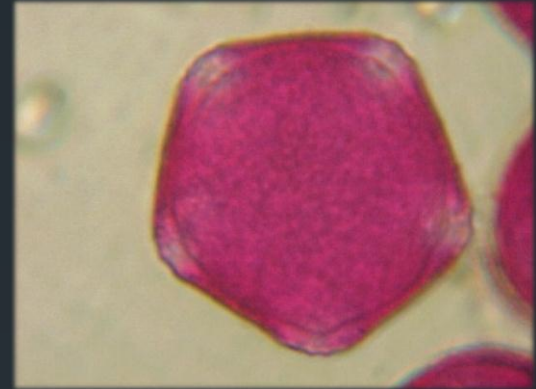
9. Central Region: Short-Grass Prairie

# Trees

- Ash/Olive/Privet
- Alder/Birch
- Box elder/Maple
- Cottonwood/Aspen/Poplar/Willow
- Chinese Elm
- Juniper/Cedar
- Oak
- Ponderosa Pine



Ash pollen



Cottonwood pollen





# Grass

- Kentucky Blue (June)
- Orchard
- RedTop
- Timothy
- Sweet Vernal
- Meadow Fescue
- Perennial Rye

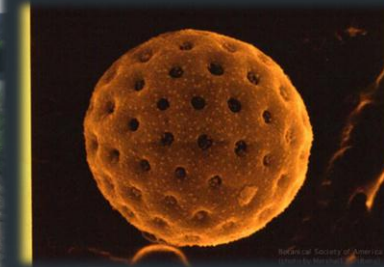


20 to 60  $\mu\text{m}$



# Weeds

- Dock/Sorrel →
- English Plantain
- Sagebrush/mugwort
- Saltbush/Atriplex
- Russian Thistle (tumbleweed)
- Burweed marshelder
- False ragweed ↘
- Cocklebur



# Outdoor Mold: “Field mold”

Alternaria



Snowshoe: 12x33  $\mu\text{m}$

Cladosporium  
(Hormodendrum)



Chains with small  
attaching collar: 4x16  $\mu\text{m}$

1000x higher airborne counts than pollen



# Asthma Deaths: Risk Factor

- MOLD

- Odds of a death from asthma occurring on days with mold spore counts of  $>1000$  spores/m<sup>3</sup> was **2.16 X higher** (95% CI = 1.31, 3.56,  $p = 0.003$ ) than on days on which mold spore counts were  $<1000$  spores/m<sup>3</sup> **JACI 1995;95:955-6**

# Pollen Counting

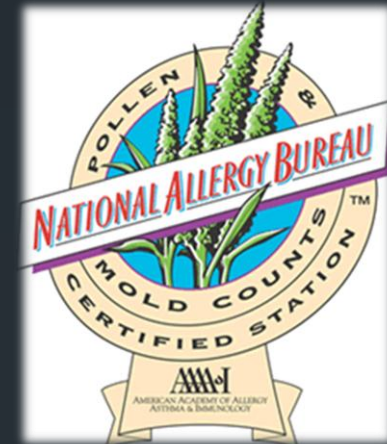


Burkhard Spore Trap

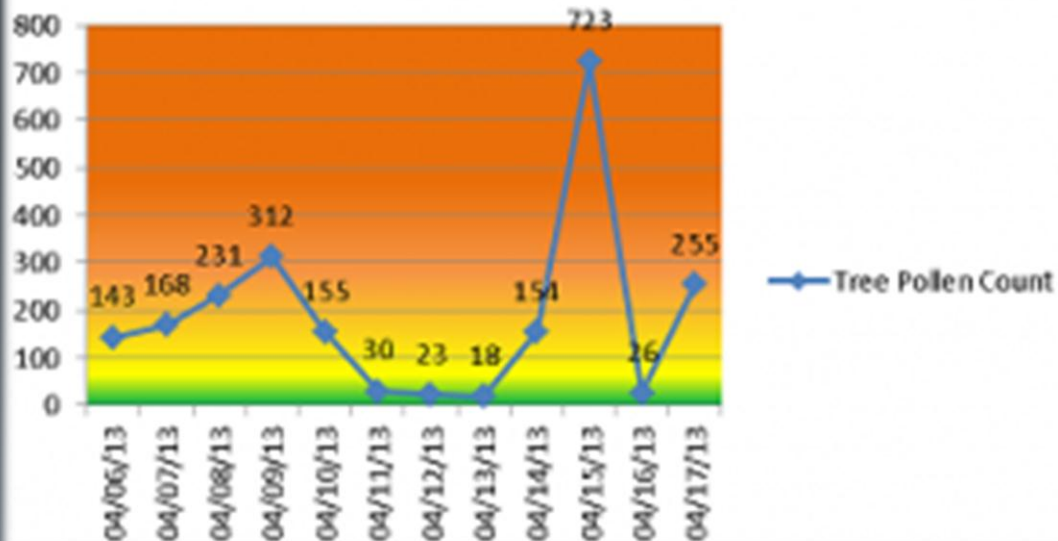


# Pollen Counting

- Pollen: 2 to 250  $\mu\text{m}$
- Windborne: 20 to 60  $\mu\text{m}$



Tree Pollen Count



**Total Pollen Count=**  
grains of pollen per  
cubic meter of air  
sampled

4/24/13

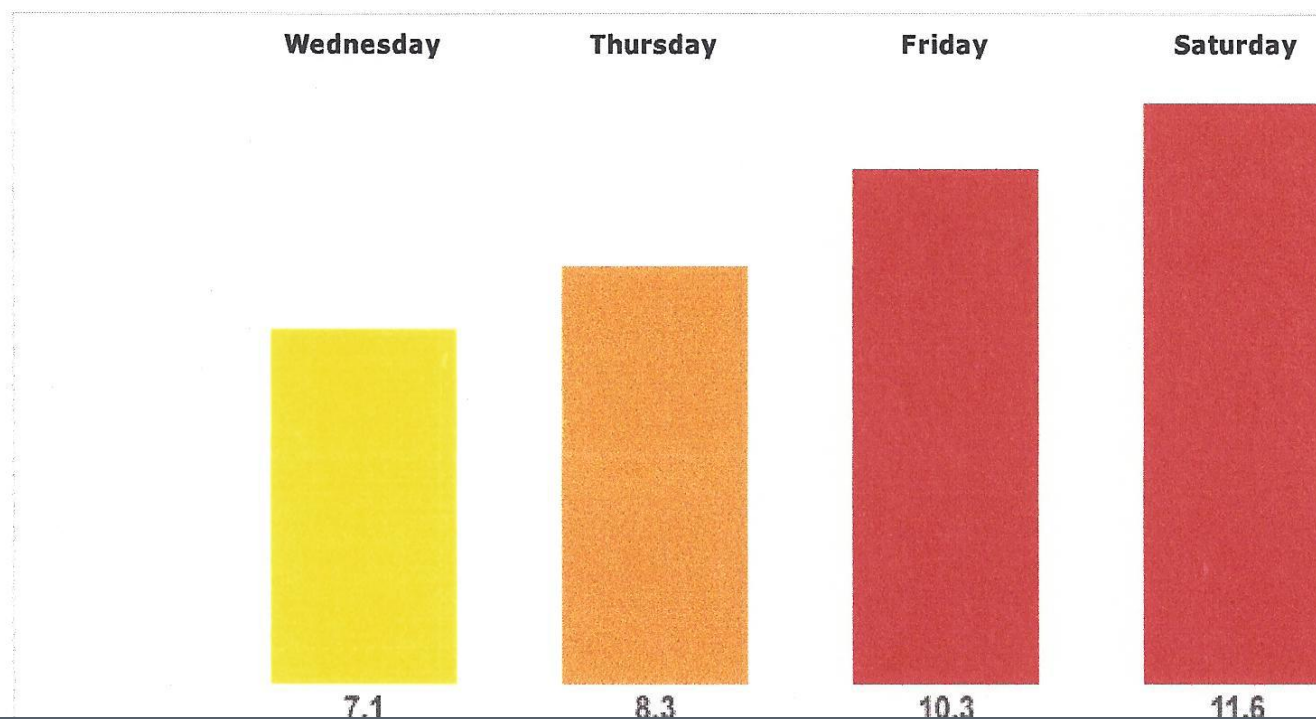
Pollen.com - Free 4-Day Allergy Forecast for BOZEMAN, MT



**Wednesday, April 24, 2013 Allergy Forecast**  
for Bozeman, MT (59718)

Today's Level: **7.1**  
**Medium**

**Predominant Pollen:** Alder, Cedar, Juniper, Elm





# Outdoor Animals

- 22 y/o F  
tagging/branding cattle:
- Rhinitis/conjunctivitis
- Wheezing and cough
- Contact with rope that  
touched cattle---rash
- Allergy skin test:  
+++cattle
- Other: horses



# Air Pollution



Thank you, Idaho!

# Air Pollution

- In Montana, biggest sources are:
  - Wildfires
  - Prescribed burning
  - Wood stoves
  - Valley inversions
  - Power plants
  - Motor vehicles
  - Industrial and chemical facilities

Missoula



Butte



# State of the Air National Report

PM<sub>2.5</sub>-Fine Particulate Matter for 2009-2011

Grade = # of days w/ unhealthy air

- Best city: Honolulu
- **Montana Counties:**
  - “A” grade: Flathead, Richland, Sanders
  - “C” grade: Gallatin, Lincoln
  - “D” grade: Missoula
  - “F” grade: Lewis & Clark, Ravalli, Butte-Silver Bow
- Worst city: LA



# Air Pollution: Grades

Bozeman

- Gallatin: “C” 3 days; 2 in 2009 from W. Yellowstone
- Doesn't include: 12 days last summer!



Gallatin

**County air quality receives 'C' grade**

By LAURA LUNDQUIST  
Chronicle Staff Writer

For the past few years, sooty air has occasionally blurred some of the Big Sky and posed health threats for Montanans, according to an American Lung Association report.

In its "State of the Air" national report released Wednesday, the American Lung Association graded nine Montana counties, and only three received high marks for overall air quality. That's troubling news for those with respiratory problems like asthma or emphysema.

Gallatin County received a "C" grade due to three days where the air quality reached unhealthy levels between 2009 and 2011, according to Department of Environmental quality records.

The American Lung Association gave Gallatin County a "C" grade due to three days where the air quality reached unhealthy levels between 2009-2011

Flathead, Richland and Sanders counties sailed through those three years with no unhealthy air quality while Silver Bow, Lewis and Clark, and Ravalli counties flunked for the amount of pollution in their air. Silver Bow County led with 19 days where air quality stayed unhealthy over a 24-hour period.

The nine counties are the only ones in Montana with air-quality sensors sensitive enough to measure soot particles as small as 2.5 micrometers, one-thirtieth the width of a human hair.

The sun sets over a smoke-filled sky in Bozeman in this Sept. 20, 2012 file photograph.

ADRIAN SANCHEZ-GONZALEZ/CHRONICLE

More AIR | A10

**TODAY'S WEATHER**  
Sunny, clear  
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# Air Pollution Health Affects

- Exacerbate vs. development of lung diseases
- Individual pollutants or the “toxic brew”
- Age factor: children more prone to ozone than PM
  - In children: ozone + exercise
- Exacerbations of asthma:
  - Inflammation: ozone, PM,  $\text{NO}_x$ , Diesel exhaust particles
  - Bronchospasm:  $\text{SO}_2$
- Traffic-related emissions:
  - Diesel (DEP);  $\text{NO}_x$ , CO + VOC  $\rightarrow$  ozone



**Pollution  
is much higher near busy roads**



## A Penny for Prevention: Case for Cleaner Gasoline and Vehicle Standards

- This year, U.S. EPA can take action to cut emissions from cars, light trucks and SUVs by setting cleaner gasoline and vehicle standards.
- Reduce nitrogen oxides, CO and VOC
  - (similar to California standards)





# Clean Air Task Force

- **Cleaner gasoline will reduce emissions as much as removing 33 million cars from the road for about 1¢/ gallon.**



## Est. health benefits from PM<sub>2.5</sub> reductions resulting from cleaner gas & vehicle standards

<u>Health Endpoint</u>	<u>Avoided cases</u>	<u>Econ Impact (millions \$)</u>
■ Acute Bronchitis	1,342	\$ 0.6
■ Acute Resp Sx	686,785	N/A
■ Asthma Attacks	15,184	\$ 0.8
■ ER Visits, Resp	854	\$ 0.3
■ Work Loss Days	115,416	\$ 16.0

# Air pollution + Allergies= ??

- **Does air pollution increase the effect of aeroallergens on hospitalization for asthma?**
- Cakmak, JACI 2012 Jan;129(1):228-3
- Sought to compare effects of aeroallergens on hospitalization for asthma between high & low air pollution days in 11 large Canadian cities.
- **Assess:** PM<sub>2.5</sub> and PM<sub>10</sub> vs. tree and mold spore counts
- **Results:** increased admissions when air pollution high
- **Conc:** Association between aeroallergens and hospitalizations for asthma, which was enhanced on days of higher air pollution.

# Weather changes

- NHLBI guidelines:
  - Cold air
  - Temperature changes
  - High humidity





# Outdoor Asthma Triggers

- Pollen (Fragments)
- Mold
- Animal dander (cattle, horse)
- Air pollution
  - Particulate matter (PM<sub>2.5</sub>)
  - NO<sub>x</sub>, O<sub>3</sub>, VOC, and SO<sub>2</sub>
- Weather, temperature and humidity changes

# Thanks

